Geophysical Research Abstracts, Vol. 9, 07890, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-07890

Consideration of Europa's icy shell thickness from the observation of its orbital motion

R-M. Balland (1), V. Lainey (2), P. Rosenblatt (1) and V. Dehant (1)

(1) Royal Observatory of Belgium, Brussels, Belgium, (2) Institut de Mécanique Céleste et de Calcul des Ephémérides, Paris, France (rosenb@oma.be / Fax : +3223749822 / Phone : 003223736730)

Europa most probably has an internal ocean beneath its icy shell. According to two different models of Europa's internal structure, the thickness of the icy shell is a few km or a few ten km. The possibility of having liquid water is due to tidal interactions which provide a heating process into the satellite, as well as, an orbital acceleration. This acceleration differs according to the ratio of the Love number k2 out of the dissipation rate Q, this latter depending on the icy shell's thickness. Hence, a measurement of this acceleration should, in principle, allow us to decide between the two models.

We studied Europa's orbital motion by mean of numerical integration. Using least-squares method we quantified the influence of Europa's tidal acceleration among the Galilean system, and compared it to the accuracy of the astrometric observations. The correlation, between Io's and Europa's tidal acceleration was found to be a crucial point.